

# Afghanistan: A Demographic Uncertainty

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No. 6

# Afghanistan: A Demographic Uncertainty

by  
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## INTRODUCTION

Demographic data for Afghanistan are scarce. The only available data on the population of Afghanistan are from the 1972-73 survey of the settled population, known as the Afghan Family Guidance Survey, and the 1972-73 survey of the nomad population, known as the Afghan Family Guidance Survey. The 1972-73 survey, sponsored by the Government of Afghanistan and the U.S. Agency for International Development and implemented by the State University of New York at Buffalo, there had never been a comprehensive national demographic survey.

While the 1972-73 survey concentrated on the settled population, a large nomad population is known to exist. The exact size of this segment of the population is unknown, but estimates range from 1 to 2 million people, and is a major contributing factor to the demographic uncertainty surrounding the data for Afghanistan. Since data on the demographic and socioeconomic characteristics from the 1972-73 survey apply only to the settled population, this leaves the demographer in the uncomfortable position of either ignoring the nomad population (which could represent 9 to 14 percent or more of the total population) or assuming that the characteristics of the settled population also apply to a nomad population about which virtually nothing is known.

### The Problem

The problem addressed in this paper involves the utility of data from a single survey for establishing a plausible and consistent set of demographic estimates, given the absence of additional demographic data sources. The paper considers the internal consistency of reported data for the settled population of Afghanistan and the utility of various demographic techniques for evaluating and adjusting the reported data. Adjustments are made to the reported data using a variety of demographic techniques and resulting estimates are judged "reasonable" or "unacceptable" on the basis of known demographic relationships which take into consideration the underlying assumptions of the techniques used in the analysis.

### An Overview of the Survey

The 1972-73 survey was an outgrowth of interest expressed in 1969 by the Afghan Family Guidance Association and the Ministry of Public Health in obtaining information concerning the knowledge, attitudes, and practice of family planning among the Afghan population. It soon became apparent, however, that there was a concomitant need for accurate national demographic data. Consequently, the scope of the survey was expanded to include demographic as well as family planning information (Survey Report, Vol. 2, 1975, pp. 3-5).<sup>1</sup> The fieldwork for the survey of the settled population began in the fall of 1972 and ended in the fall of 1973. Approximately 21,000 household interviews were conducted and an additional 10,000 marital and pregnancy histories were collected from ever-married women. In all, information relating to approximately 120,000 individuals was obtained (Survey Report, Vol. 2, 1975, pp. 215-217). During the summer of 1974 a complementary survey was conducted among the nomad

population. There have been no demographic results from this survey. The results of the 1972-73 survey are presented in the Survey Report (Survey Report, Vol. 2, 1975).

## ANALYSIS OF DATA REPORTED FOR THE SETTLED POPULATION

A number of factors regarding the reported data should be kept in mind throughout the analysis. Each cell within each table (including the reported totals) was estimated independently. Therefore, the reported total figures for a given table were not always equal to the sum of the subcategories. Although absolute numbers varied between tables, the differences were insignificant and did not affect the reported percentages. The data were collected in various waves during 1972-73 and must be viewed in terms of an average relating to this period. Consequently, data for births and deaths refer to a 12-month period preceding the interviews and do not refer to the same base period.

### Fertility

The survey collected both current and cumulative fertility data for the settled population, i.e., the number of children born in a preceding 12-month period, and the number of children ever born (see table A). The age-specific fertility rates based on the number of children born in the recent past imply a total fertility rate of 6.9 per woman and a crude birth rate of 43 per 1,000 population (Survey Report, Vol. 1, 1975, table III.1).

A rejuvenation technique was used to evaluate the reported crude birth rate. This technique incorporated the reported number of persons in the age groups 0 to 4 and 5 to 9, survival ratios for these age groups implied by the reported age-sex-specific death rates, and the rate of natural increase implied by a reported crude birth rate of 43 per 1,000 population and a crude death rate of 21 per 1,000 population. It was assumed that the survival ratios and the rate of natural increase had remained constant during the 10 years prior to the survey period. The results of rejuvenating the population age 0 to 4 implied a crude birth rate of 44 per 1,000 population, while rejuvenating the population age 5 to 9 implied a crude birth rate of 50 per 1,000 population. These estimated rates and the reported rate form a preliminary range for the crude birth rate of between 43 and 50 per 1,000 population. However, the results from the rejuvenation technique must be viewed with caution because of the probable differential underenumeration and age misreporting between these two age groups. These findings are also contingent upon the validity of assuming that the implied survival ratios and the reported rate of natural increase are appropriate for the recent past.

The rejuvenation technique discussed above considered the relationship between the reported births, deaths, and population under 10 years of age. A technique developed by Brass (Brass, et al., 1968, pp. 29-104) yields a second approximation based

<sup>1</sup> The complete citation for the volumes of the report are listed in the references under "Survey Reports."

<sup>2</sup> For further discussions of predictive sampling see Kalbfleisch and Sprott (1969), and Royall (1970, 1971, and 1973).

Source: Adapted from Survey Report 2014-2015, pp. 10 and 11.

Table 8. Adjusted Age-Specific Fertility Rates, by Method, and Brass P/F Ratios, by Age of Woman, for the Settled Population of Afghanistan: 1972-73

Method of adjustment and P/F ratios	15 to 19 years	20 to 24 years	25 to 29 years	30 to 34 years	35 to 39 years	40 to 44 years	45 to 49 years
Adjustment based on P <sub>20-24</sub> /P <sub>15-19</sub> ratio	180.5	215.5	256.2	326.0	393.1	497.4	604.5
Adjustment based on P <sub>35-39</sub> /P <sub>15-19</sub> ratio	157.3	161.3	197.4	236.2	272.7	363.3	410.0
P/F ratios (adjustment factors)	2.55	3.48	4.29	5.26	6.22	7.14	8.12

Source: Based on survey data adjusted to hold U.S. Bureau of the Census

on the relationship between the reported number of children born in the recent past and the number of children ever born. The age-specific fertility rates as adjusted by the Brass technique as well as the P/F ratios are presented in table B.

Results from the application of the Brass technique to the reported data implied total fertility rates between 8.9 and 10.2 per woman, and crude birth rates ranging from approximately 55 to 63 per 1,000 population. The validity of these results are affected by errors in the reported data, as well as particular biases associated with the underlying assumptions of the technique. The Brass technique assumes that fertility has remained constant for the past 10 to 15 years. In the case of Afghanistan, this assumption appears to be appropriate because none of the expected indicators exhibited by a population experiencing a decline in fertility are present.<sup>3</sup> The Brass technique additionally assumes that the data for children born in the recent past accurately reflect the pattern of fertility and that the level of fertility is accurately reflected by data on the number of children ever born to women under 30 years of age.

There are indications from the trend in the P/F ratios (see table B), that the expected relationship between current and cumulative fertility is not present. That is, while the increasing differentials between successive P/F ratios from the age groups 25-29 to 40-44 conform to the expected pattern, the large differential between the 20-24 and 25-29 year age groups is

questionable. This pattern, coupled with the extremely high estimates of fertility and the high mortality conditions reported by the survey, leads to the conclusion that the Brass adjustments are suspect.

As a further estimate for Afghan fertility a curve-fitting technique was applied to the children-ever-born data which resulted in estimated age-specific fertility rates. In this technique a Lagrange curve is fit through the data for the average number of children ever born per woman between ages 15 and 39; a Gompertz curve is used to extrapolate cumulative fertility beyond age 39 on the level established by the Lagrange curve. Thus, the technique corrects for the possible misreporting of children-ever-born data at the older ages. The estimated age-specific fertility rates based on this technique imply a greater proportion of children being born to women between ages 15 and 34 than do the age-specific fertility rates reported in the survey (see tables A and C).

The curve-fitting technique is dependent upon the correct reporting of the children-ever-born data between ages 15 and 39. Misreporting of these data may result in an estimated pattern of fertility which deviates from the "actual" pattern. Care must also be taken in choosing the pivotal ages through which the Lagrange curve is fit since this may also affect the estimated pattern. The only indication of the "actual" pattern of fertility is the pattern based on current fertility reported in the survey. Results from the curve-fitting technique are markedly divergent from the reported pattern, and the estimated pattern is not accepted.

While the estimated pattern does not appear to be acceptable, the total fertility from this technique agrees with the reported cumulative fertility of 7.7 children per woman. Furthermore, the number of additional children desired by

<sup>1</sup> The survey data indicate that current and expected fertility are high with a concomitant high level of mortality, marriage among the young female population is almost universal, literacy and labor force participation among females are negligible, and there is a general lack of knowledge concerning family planning. A pattern of declining fertility would tend to show the reverse.

parity from the KAP portion of the survey indicates a degree of consistency with the reported cumulative fertility at zero parity about four children is desired, one additional child is desired at parity two, and one additional child is desired at parity six. Survey Report, 1975, Vol. 2, table V-2). Although the level of actual fertility is not certain, it could appear that some allowance can be given to a total fertility rate of approximately eight children per woman.

The Brass and the curve-fitting techniques indicated that the patterns from the current and cumulative fertility data were not consistent. In such circumstances it is difficult to select a single pattern in the absence of auxiliary data. Table C presents the age-specific fertility rates estimated from the curve-fitting technique, and the age-specific fertility rates obtained by applying the pattern from the current fertility to the level estimated by the curve-fitting technique (7.7 children per woman). Crude birth rates corresponding to these two sets of estimated age-specific fertility rates, applied to the reported female age distribution, are 52 and 48 per 1,000 population, respectively.

As a final attempt to ascertain the pattern of fertility, the standard age pattern of female marital fertility was used (United Nations, 1967, p. 24). This standard is based upon the average experience of a number of populations in which little or no birth control is practiced (as appears to be the case in Afghanistan). Given the high proportion of females in the childbearing years who are married, childbearing outside of marriage is considered negligible. Therefore, the pattern resulting from estimated marital fertility would reflect the pattern of actual fertility. The proportional distribution of the age

pattern of fertility estimated by this technique is shown in table D. Although the values of the indices of dissimilarity are low, the two patterns appear to be quite different, and are of different fertility patterns.

The two sets of fertility data from the survey were taken from the preceding 12 months (current fertility) and from ever born (cumulative fertility) were analyzed using these techniques in order to derive a level and pattern of fertility. A level of fertility corresponding to a total fertility rate of about eight children per woman was accepted, and two patterns of fertility appear plausible: one based on current fertility and the other based on cumulative fertility resulting in estimated crude birth rates in the range of 48 to 52 per 1,000 population, respectively.

## Mortality

The Afghan survey collected information on the number of deaths by age and sex which occurred during a preceding 12-month period. The corresponding age-sex-specific death rates are presented in table E. As an initial step for estimating mortality, abridged life tables for each sex were generated from the reported age-specific death rates. Estimated life expectancies at birth of 46 years for males and 43 years for females were obtained from these life tables. The estimated survival ratios based on the reported data for each sex were compared to survival ratios from the four families of Coale-Demeny model life tables at similar levels of mortality in order to ascertain the approximate pattern of Afghan mortality (Coale and Demeny, 1966). The

Table C. Adjusted Age-Specific Fertility Rates, by Method and Age of Woman, for the Settled Population of Afghanistan: 1972-73

(Rates per 1,000 women)

Method of adjustment	15 to 19 years	20 to 24 years	25 to 29 years	30 to 34 years	35 to 39 years	40 to 44 years	45 to 49 years
Curve fitting.....	240.4	314.9	365.0	321.9	196.5	86.1	23.5
Current Fertility pattern adjusted to level estimated by curve fitting <sup>1</sup> .....	136.9	314.9	345.7	292.5	237.2	142.0	79.2

<sup>1</sup>The current fertility pattern is based on children born in a preceding 12-month period (see table A).

Source: Based on survey data adjusted at the U.S. Bureau of the Census.

Table D. Percent Distribution of Age-Specific Fertility Rates, and Index of Dissimilarity, by Method

Method	Index of dissim- ilarity	Age of woman						
		15 to 19 years	20 to 24 years	25 to 29 years	30 to 34 years	35 to 39 years	40 to 44 years	45 to 49 years
Standard marital fertility pattern applied to Afghanistan.....	0.0	10.7	22.0	22.1	20.3	16.1	7.5	1.1
Curve fitting.....	7.0	15.5	20.3	23.6	20.8	12.7	5.6	1.5
Current fertility pattern adjusted to level estimated by curve fitting.....	1.3	8.2	20.3	22.3	18.4	15.3	9.2	5.2

Source: Based on survey data adjusted at the U.S. Bureau of the Census.

Table E. Reported and Adjusted Age-Sex-Specific Death Rates, by Method, for the Settled Population of Afghanistan: 1972-73

Age group (years)	Male				Female		
	Survey	Adjusted data			Survey	Adjusted data	
		Method one	Method two	Method three		Method one	Method two
0 to 4 years.....	81.7	92.2	91.1	96.3	65.7	77.6	81.7
5 to 9 years.....	5.1	6.5	4.3	8.8	6.5	6.6	9.1
10 to 14 years.....	5.0	3.2	2.3	4.3	7.4	3.8	5.2
15 to 19 years.....	4.6	5.0	3.7	6.6	10.1	5.2	7.2
20 to 24 years.....	5.7	7.4	5.3	9.9	14.7	6.8	9.6
25 to 29 years.....	3.7	7.6	5.5	10.2	8.9	8.0	11.6
30 to 34 years.....	5.1	8.4	5.5	11.8	16.8	3.9	13.1
35 to 39 years.....	6.7	10.4	6.9	14.8	10.3	4.9	14.7
40 to 44 years.....	9.1	13.1	8.7	18.8	9.0	10.7	15.8
45 to 49 years.....	13.0	16.6	11.1	23.8	13.0	12.2	17.9
50 to 54 years.....	16.8	21.7	14.8	30.8	18.5	16.3	24.0
55 to 59 years.....	22.6	29.6	20.1	41.6	12.4	23.9	35.9
60 to 64 years.....	49.3	41.8	27.9	59.1	41.0	37.0	56.3
65 to 69 years.....	31.9	62.2	40.4	88.5	41.6	37.9	85.4
70 to 74 years.....	38.9	93.6	60.3	131.4	69.0	49.7	134.1
75 to 79 years.....	191.4	141.2	91.9	192.4	106.5	137.6	197.1
80 years and over.....		243.3	216.8	258.8		237.6	257.8
Life expectancy at birth (years)....	46	38	42	34	43	41	36

<sup>1</sup>Refers to age group 75 years of age and over.

Source:

Survey: Survey Report, Vol. 1, 1975, p. 48.

Method one: Coale-Demeny East model life table, which corresponded to the  $I_2$  value derived from the Brass estimate of  ${}_2q_0$ .

Method two: Logit procedure which used Coale-Demeny East model life tables as a standard and accepted the  $I_2$  value derived from the Brass estimate of  ${}_2q_0$ . The level for the standard was selected by comparing the reported crude death rate for the age group 20 to 49 with corresponding crude death rates from model life tables.

Method three: Logit procedure which accepted the female  $\beta$  obtained in the second method, the male  $I_2$  value derived from the Brass estimate of  ${}_2q_0$ , and used as a standard the male Coale-Demeny East model life table corresponding to the female model used in the second method.

mean relative differences between the estimated and model survival ratios indicated that reported male mortality was most closely characterized by the Coale-Demeny East pattern, and reported female mortality was characterized by the West pattern. As a first approximation for the pattern of mortality, the East pattern was accepted for both sexes since reported male age-specific mortality rates appeared to be less subject to the combined effect of age misreporting and differential underreporting than did the female rates. Male reported rates also appeared to present a more acceptable pattern of mortality than the reported rates for females (see figures 1 and 2).

A first approximation for the level of Afghan mortality was based on the reported number of children ever born and children surviving (Survey Report, 1975, Vol. 1, table V. 1). These data were not reported for each sex separately. Applying the Brass mortality technique (Brass, et al., 1968, pp. 104-119) to these data resulted in an estimated  ${}_2q_0$  of .274 and  $I_2$  of 72,600. A life expectancy at birth for both sexes of 39.5 years corresponds to the above values. In order to derive the corresponding male and female  $I_2$  values, East model life tables for males and females at the same level of mortality were selected such that weighting the model  $I_2$  values by an assumed sex ratio at birth of 1.05 would result in an  $I_2$  value for both sexes equal to the empirically derived  $I_2$ . Life expectancies at birth of 38 years for males and 41 years for females were obtained (see table E, method one).

A graphical comparison between the reported age-specific death rates and the  $m_x$  values from the selected model life tables (see figure 1), showed that the pattern from the selected male life tables appeared acceptable. However, a similar comparison for females (see figure 2) implied that more deaths were reported in the survey than would be implied by the model for females aged 10 to 34. As the findings from the graphical comparison for females was unacceptable, a logit technique was employed (see Brass, et al., 1968, pp. 127-132).

The logit technique is a method used to adjust a standard (model) life table to incorporate characteristics of empirical mortality data as determined by selected reference points, in the present case  $I_2$  and  $I_{35}$ . The technique estimates two parameters;  $\alpha$ , which signifies how the empirical level of mortality differs from that of the standard, and  $\beta$  which determines how the empirical pattern differs from that of the standard.

In the first approximation, the level for the standard life table for each sex was selected by comparing the reported crude death rates by sex for ages 20 to 49 with the corresponding rates found in the Coale-Demeny East model life tables. The reported data for females aged 20 to 49 were thought to adequately describe the mortality experience for this broad age group. To apply a consistent procedure, the male standard was selected in the same manner. The standard corresponded to Coale-Demeny East mortality levels 6 and 13 for females and males, respectively.



Figure 1. Reported and Adjusted Male Age-Specific Death Rates for the Settled Population of Afghanistan: 1972-73

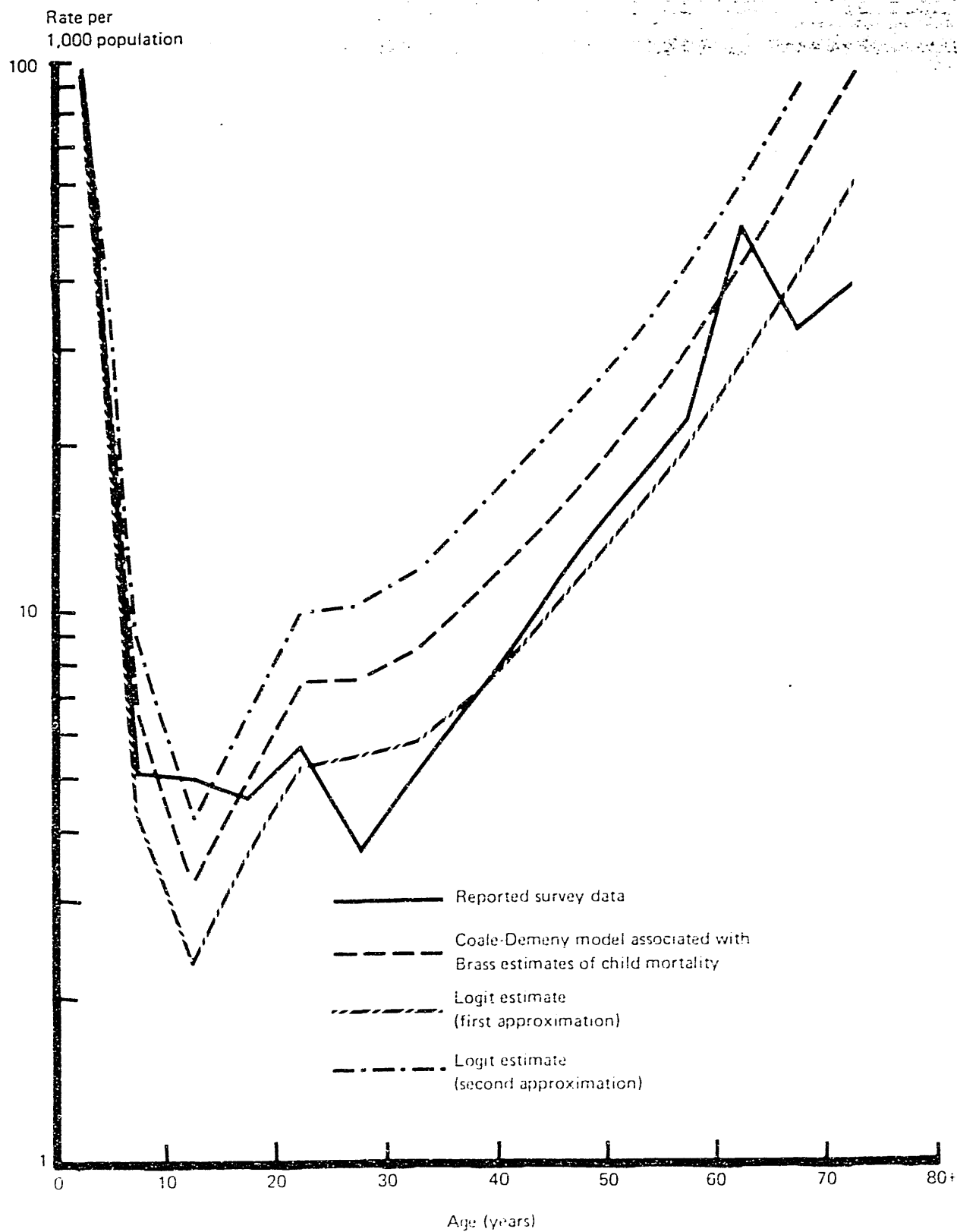
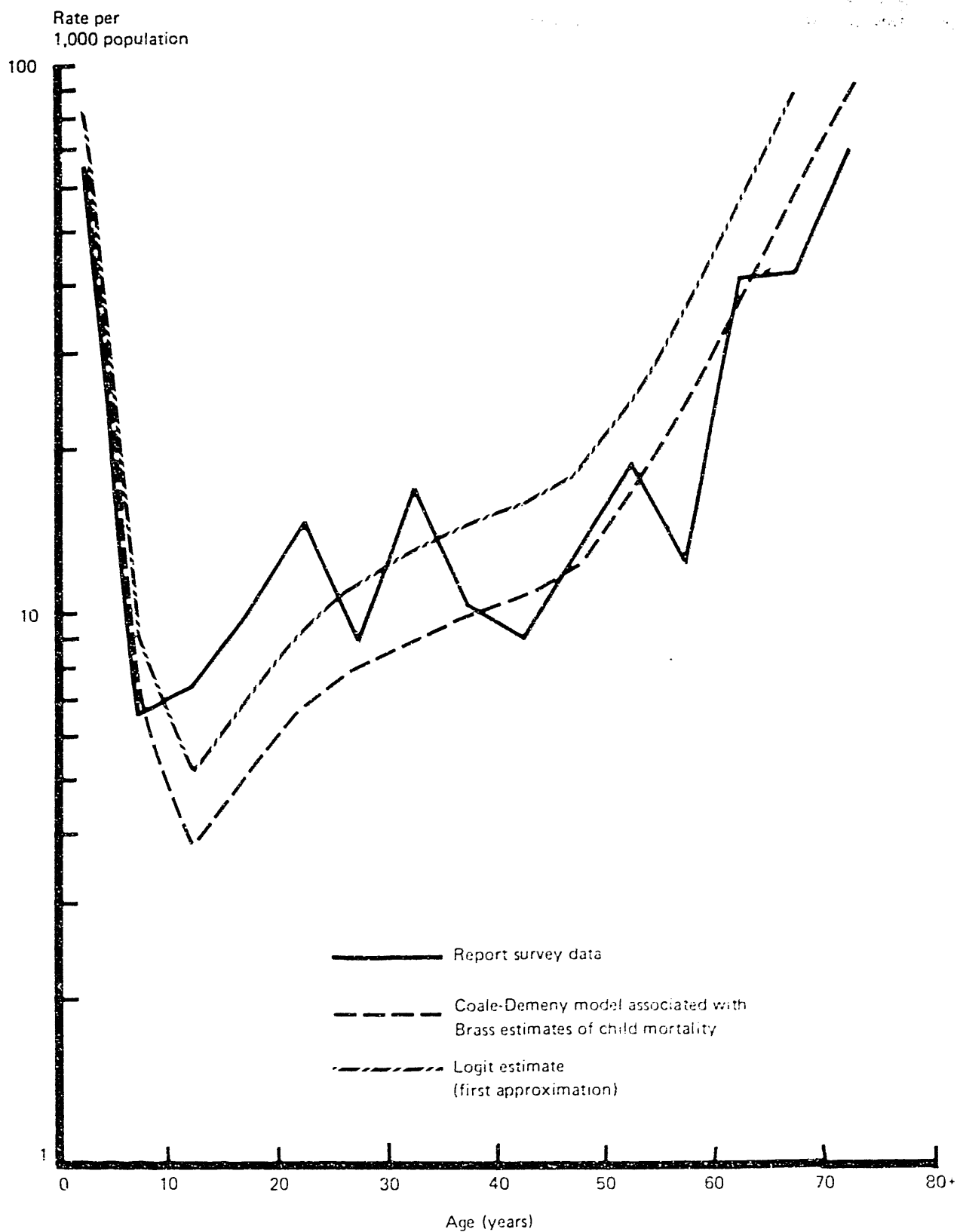


Figure 2. Reported and Adjusted Female Age-Specific Death Rates for the Settled Population of Afghanistan: 1972-73



Source: Table E

The  $1/2$  values for each sex derived from the Brass estimate of  $q_0$  was accepted as one reference point. The second point was an estimated  $1/35$  value. These values were estimated for each sex by assuming that the relationship between the empirically based  $1/2$  and the estimated  $1/35$  is the same as the relationship observed between  $1/2$  and  $1/35$  values in the standard.

This procedure resulted in estimated life expectancies of 42 years for males and 36 years for females (see table E, method two). When  $m_x$  values from these adjusted life tables were graphically compared to the reported age-sex-specific death rates it appeared that a satisfactory level and pattern of female mortality had been achieved (see figure 2). However, the comparison for males implied that the survey data showed too many reported deaths for males aged 5 to 19 (see table E and figure 1). This finding led to another estimate for male mortality.

The same logit technique as outlined above was used in making a second approximation for male mortality. The Coale-Demeny East region model life table level 6 which corresponded to the female model in the first approximation, was accepted as the male standard. The same male  $1/2$  level was used as was accepted in the first approximation. The female  $\beta$  from the first approximation was accepted as the male  $\beta$  for this second approximation. Here, the assumption was made that the pattern of male mortality differed from the East region in the same way as the pattern of females differed from the corresponding East region. The logit procedure was followed and a life table generated which gave an estimated male life expectancy at birth of 34 years. The level of mortality obtained through this approximation lowered the male life expectancy at birth from 42 years to 34 years (see table E, method three).

Based on the above adjustment procedures, the range for Afghan mortality, as expressed in terms of life expectancies at birth, is 34 to 42 years for males and 36 to 41 years for females. Taking into consideration the graphical comparison between reported and adjusted rates, it is felt that the life expectancies of about 34 years for males and 36 years for females would be reasonable estimates. Crude death rates (based on the reported age sex distribution) associated with the various estimates of life expectancy at birth from the life tables are shown in table F.

Problems in estimating Afghan mortality are evident. The reported data indicate that female mortality is higher than male mortality. However, where estimates were obtained showing higher female than male mortality the estimates from the reported data without adjustment and the first approximation from the logit transformation inconsistencies were found between the adjusted and reported data which were unacceptable (see pp. 15-16 and table E). Based on only one set of data for one point in time, it is difficult to say with certainty what the actual sex differentials are. What is evident, however, is that most models of mortality will not accommodate data such as was found in the Afghan survey and further analysis of the mortality data is needed.

### Age-Sex Distribution

An initial analysis of the reported age-sex distribution revealed a number of inconsistencies in the data (see table G for reported data). A comparison of the number of persons in successive age groups by sex indicated the presence of age

Table F. Estimated Measures of Mortality, by Method, for the Settled Population of Afghanistan: 1972-73

Method	Life expectancy at birth (years)			Crude death rate (per 1,000 population)
	Both sexes	Male	Female	
Reported survey estimates..	44	46	43	21
Coale-Demeny model associated with Brass mortality estimates based on reported children ever born and children surviving.....	40	48	41	25
Logit mortality estimates (first approximation)....	40	42	40	25
Logit mortality estimates (second approximation)....	34	34	36	30

Source: Based on survey data adjusted at the U.S. Bureau of the Census.

misreporting, especially in the older ages (see figure 3). Although a certain amount of fluctuation may be expected, it is difficult to say with certainty (on the basis of one survey) what impact past fertility, and more importantly mortality, may have had on the reported age distributions. The extremely high sex ratios implied by the reported data may indicate differential underenumeration by sex and/or differential mortality. There is some suspicion that females were not always reported, nor was accurate information about them always given since data were collected from heads of household, nearly always males in this male oriented society. Evidence of differential mortality is suggested by the reported mortality data.

The relatively small 0 to 4 age group in the reported data is generally indicative of underenumeration and is found in many censuses and surveys. There may also have been age misreporting, persons may have been reported in the 5 to 9 age group when they should have been reported in the 0 to 4 age group or 10 to 14 age group. In order to correct the obvious inconsistencies in the reported age-sex distribution, a number of adjustments were made.

The Afghan survey incorporated a quality control system consisting of two types of procedures: (1) quality control of interviewing, and (2) quality control of mapping and prelisting which checked for the completeness of household counts in sample sites (Survey Report, 1975, Vol. 1, p. 168). The control procedures found a total net underenumeration of 4.1 percent for males and 3.9 percent for females. No net coverage error was reported by age. As an initial step in the adjustment, the estimates of total net underenumeration were proportionally distributed among the male and female age distributions. The resulting 10-year age groups were split into 5-year groups in order to minimize the effect of age misreporting while taking into consideration possible demographic irregularities caused by actual changes in past mortality and fertility (Armata, 1966, p. 295).

A number of assumptions were made in order to adjust for further net underenumeration. First, the current level of fertility was estimated by a curve-fitting technique based on reported cumulative fertility data, using the reported pattern

Table G. Reported Age-Sex Distribution and Sex Ratios for the Settled Population of Afghanistan: 1972-73

Age	Settled population			Sex ratio
	Both sexes	Male	Female	
All ages.....	10,020,099	5,373,249	4,646,850	115.6
0 to 4 years.....	1,674,520	841,006	833,514	100.9
5 to 9 years.....	1,604,075	819,704	784,371	104.5
10 to 14 years.....	1,279,611	706,438	573,173	123.3
15 to 19 years.....	943,968	532,839	411,129	129.6
20 to 24 years.....	830,022	448,300	381,722	117.4
25 to 29 years.....	692,376	350,613	341,763	102.6
30 to 34 years.....	627,295	326,405	300,890	108.5
35 to 39 years.....	516,731	283,048	233,683	121.1
40 to 44 years.....	443,649	243,771	200,078	121.8
45 to 49 years.....	329,450	185,231	144,219	128.4
50 to 54 years.....	331,294	181,017	150,277	120.5
55 to 59 years.....	195,156	114,967	80,269	143.3
60 to 64 years.....	222,037	132,282	89,755	139.6
65 to 69 years.....	108,416	67,941	40,475	161.3
70 to 74 years.....	112,628	71,946	40,682	176.8
75 to 79 years.....	41,272	28,484	12,788	222.7
80 years and over.....	62,139	40,137	22,002	182.4

Source: The reported age distributions (Survey Report, 1975, Vol. 3, p. 1) were adjusted to the reported totals for each sex, and persons of unknown age (23,746 males and 11,092 females) and persons of unknown sex (392) were proportionally distributed.

of current fertility (see pp. 2-3). The resulting total fertility rate of 7.7 children per woman and associated age-specific rates were assumed to apply to the 10-year period preceding the survey. Second, the current level and pattern of mortality were estimated by the first and second logit procedures for females and males, respectively. Life tables generated from these procedures implied levels of mortality expressed in terms of life expectancies at birth of 34 years and 36 years for males and females, respectively (see p. 7). These levels were assumed to apply to the 10-year period preceding the survey. Finally, the sex ratios associated with the generated male and female life tables (adjusted for an assumed sex ratio at birth of 1.05) were assumed to approximate the actual sex differentials in the population.

The population 5 years of age and over was adjusted by the assumed sex ratios. Since the assumed sex ratios for each 5-year age group were lower than those implied by the reported data, adjustments were made only to the female distribution. This adjusted population 5 years of age and over was rejuvenated to a period 5 years and 10 years preceding the survey by using survival ratios from the generated life tables. Since population estimates were now available for three points in time the implied growth rates were used to obtain total population estimates for the midpoint of each 5-year period. Estimated crude birth rates were based on the age-specific rates accepted for the survey period, the rejuvenated female populations, and estimated total population figures. Using these estimated crude birth rates and the total populations for the midpoint of the two 5-year periods, an initial estimate of the average annual number of births occurring during the 10-year period preceding the survey could be obtained. Applying the appropriate survival ratios from the generated life tables to the estimated births for each period, an initial adjustment was made of the population ages 0 to 4 and 5 to 9. This procedure was repeated a number of times in order to obtain refined estimates for the population

under 10 years of age. The final adjusted population by age and sex is shown in table H.<sup>4</sup> Applying the estimated fertility and mortality rates to the adjusted population resulted in an estimated crude birth rate for the survey period of 53 per 1,000 population and an estimated crude death rate of 32 per 1,000 population.

#### Stable Population Estimates

At a number of points throughout the paper, it was assumed that the demographic characteristics of Afghanistan should resemble those of a stable population. In order to evaluate the assumption of stability, various estimated demographic parameters were compared with those implied by a stable population with similar characteristics.

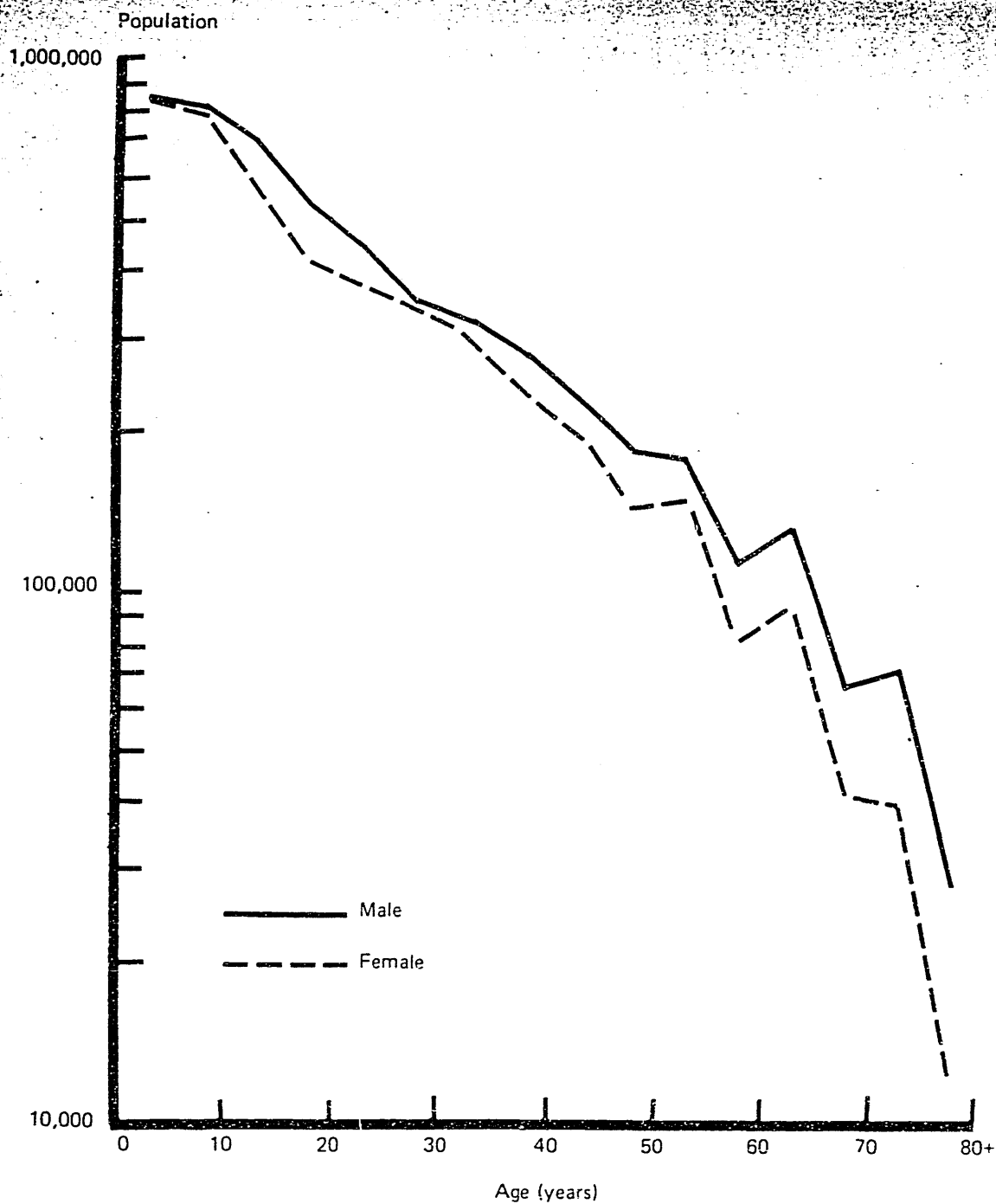
The estimated female age-specific fertility rates and the female  $L_x$  values for the childbearing ages were used to obtain an intrinsic growth rate for a stable population having similar fertility and mortality characteristics. The resulting intrinsic rate of 1.8 percent compared quite favorably with the estimated rate of 1.7 percent.

Using the estimated male and female  $L_x$  values and estimated growth rates, stable population distributions and the respective demographic parameters were obtained. The stable population intrinsic birth rates were 47 per 1,000 population for males and 44 per 1,000 population for females; intrinsic death rates were 29 per 1,000 population for males and 27 per 1,000 population for females. The corresponding estimated crude birth rates

<sup>4</sup> Implied underenumeration for the total population is 13 percent; 6 percent for males and 20 percent for females. The population under 10 years of age was adjusted for an implied 12 percent underenumeration; 11 percent for males and 13 percent for females.



Figure 3. Reported Age-Sex Distribution for the Settled Population of Afghanistan: 1972-73



Source: Table G

Table H. Adjusted Age-Sex Distribution and Sex Ratios for the Settled Population of Afghanistan: 1972-73

Age	Settled population			Sex ratio
	Both sexes	Male	Female	
All ages.....	11,521,000	5,732,000	5,789,000	99.0
0 to 4 years.....	2,029,000	1,013,000	1,015,000	99.8
5 to 9 years.....	1,700,000	847,000	852,000	99.4
10 to 14 years.....	1,418,000	708,000	710,000	99.7
15 to 19 years.....	1,168,000	584,000	584,000	100.1
20 to 24 years.....	903,000	452,000	451,000	100.2
25 to 29 years.....	760,000	381,000	379,000	100.4
30 to 34 years.....	680,000	342,000	338,000	101.0
35 to 39 years.....	584,000	294,000	290,000	101.3
40 to 44 years.....	485,000	243,000	242,000	100.5
45 to 49 years.....	412,000	204,000	208,000	98.4
50 to 54 years.....	345,000	169,000	177,000	95.3
55 to 59 years.....	292,000	140,000	152,000	92.4
60 to 64 years.....	246,000	117,000	129,000	90.4
65 to 69 years.....	193,000	91,000	102,000	89.7
70 years and over.....	307,000	147,000	160,000	91.5

Note: Figures may not add to totals due to rounding.

Source: The 1972-73 settled population adjusted for an estimated 13.0 percent net underenumeration. In the present analysis, the total net underenumeration by sex (4.1 percent for males, and 3.9 percent for females), as determined by the quality control procedures used in the survey, was proportionally distributed to the reported age-sex distribution. The resulting age-sex distribution was adjusted further by: (a) considering estimated levels of fertility and mortality during a 10-year period preceding the survey; and (b) an analysis of expected sex ratios based on the estimated 1972-73 life table.

were 51 per 1,000 population for males and 48 per 1,000 population for females; the estimated crude death rates were 33 per 1,000 population for males and 31 per 1,000 population for females. Although these values are not particularly close, there are indications that the discrepancies are a function of the adjusted age distribution.

Comparing the adjusted age distribution with the stable population distribution it appeared that the adjusted population contained a greater proportion of persons in both the younger and the older age groups than did the stable population. To see if this was the case, the natural logarithms of the ratio of the estimated percentages of population by 5-year age groups to the respective 5-year  $L_x$  values were plotted against age. The results of this procedure confirmed the belief that in the adjusted populations the number of persons in the very young as well as the older age groups were overestimated. Particularly pronounced was an overestimation of men ages 50 and over, and to a lesser extent, women ages 60 and over.

The results of the stable population analysis indicate that the adjusted estimates must be viewed as preliminary and that further analysis of the age structure is necessary.

### Family Planning

The Afghan Family Guidance Association (AFGA) established the first family planning clinic in 1968, and approximately 18 clinics were in operation by the survey date (U.S. Bureau of the Census, 1976, p. 27). As well as serving the public through clinical services, AFGA is also charged with training public health personnel in family planning, and with the collection and analysis of family planning service statistics. The AFGA, although an autonomous organization, cooperates closely with the Afghanistan Ministry of Public Health which is

also beginning to provide family planning services through basic health centers (U.S. Agency for International Development, 1975, p. 55).

The survey data relating to family planning were collected through the use of a pregnancy and marital history questionnaire. About 10,000 interviews were conducted with ever-married women selected from 21,000 households in the demographic sample. These interviews were conducted by a small group of women interviewers, an innovative accomplishment in the traditional society of Afghanistan (Survey Report, 1975, Vol. 2, pp. 200-203).

"Family planning" in the survey questionnaire was defined as any method to increase the time between births. This definition would include any folk method believed to be satisfactory for spacing births as well as methods found in a modern family planning program. At the time of the survey about 3 percent of ever-married women 15 years of age or over reported having knowledge of family planning and only one-third of those having knowledge said that they used a family planning method (Survey Report, 1975, Vol. 2, table V.3).

### Socioeconomic Data

Kinship groups based upon the extended family are the basic social units of Afghan society. Daily lives and activities are governed by religious laws and social customs recognized and accepted by these traditional people. Interaction between the traditional life style and the efforts of the government to modernize society (with an emphasis on secular education and technological and economic modernization) is only beginning (Smith, et al., 1973, pp. 89-107). Survey results relating to marital status, literacy, education, and economic activity show that marriage is almost universal in the society, that a very

small percentage of the population is educated and literacy is low, and that both education and economic activity are male dominated.

At the time of the survey about 66 percent of males and 90 percent of females 15 years of age and over were ever married. The proportion never married decreases by age to around 1 percent for both sexes. Women marry at younger ages than do men; nearly 50 percent of women in the age group 15 to 19 years are currently married compared to only 8 percent of men. The percent widowed is almost three times as high for women as for men (13.2 percent for women 15 years of age or older and 4.5 percent for men). The data show that negligible numbers of people are divorced in Afghanistan (Survey Report, 1975, Vol. 1, table IV.1).

Literacy was defined in the survey as the ability to read and write in any language used in Afghanistan. About 11 percent of the population 6 years of age and over was reported as literate: 18.7 percent of males and 2.8 percent of females (Survey Report, 1975, Vol. 1, table IV.2). For the same ages, 6 years and over, 7 percent of females and 29 percent of males attended school (Survey Report, 1975, Vol. 1, table IV.3). For the minority who did attend school, the most frequent level of educational attainment for both sexes is grade six of primary school (Survey Report, 1975, Vol. 1, table IV.4).

The "economically active" were defined as persons who worked for money or gain in the 7 days preceding the interview. About 67 percent of males and only 8 percent of females ages 8 years of age and over were classified as being economically active (Survey Report, 1975, Vol. 1, table IV.5).

## CONCLUSIONS

The National Demographic and Family Guidance Survey of the Settled Population of Afghanistan, 1972-73 provides the sole source of demographic information on a national level for this country. Great uncertainty surrounds the estimates derived from fertility, mortality, and population schedules reported in the survey. Adjustments were made to the data using demographic techniques and resulting estimates were judged "reasonable" or "not acceptable" on the basis of known demographic relationships. Given the absence of additional demographic data sources such as vital registration data, censuses, or additional surveys, these estimated demographic parameters for Afghanistan must be viewed as tentative estimates at best. The Government of Afghanistan is planning to conduct its first population census in 1978. With the availability of data from the census there will be a broader base upon which to make estimates of the demographic parameters.

The demographic techniques applied to the data for estimating fertility and mortality in this paper were by no means exhaustive. All known techniques were not attempted nor is it implied that the most appropriate ones were necessarily selected. However, it is felt that reasonable, preliminary estimates of fertility and mortality were obtained. The mortality data, in particular, would appear to need a more detailed investigation. As suggested earlier, the higher mortality for females than for males as indicated by the survey has not been investigated in depth and presents an interesting problem for future research. Also, the adjustment to the age-sex structure needs further refinement, especially in the older age groups.

Because of the uncertainty surrounding the fertility and mortality estimates it is preferable to speak in terms of ranges rather than point estimates. As discussed above, a total fertility rate of about eight children per woman was accepted as reflecting the level of Afghan fertility, and two plausible patterns of fertility were suggested. Based on the age-specific fertility rates associated with these two patterns (see table C) and the adjusted female age distribution and total population (see table H), a crude birth rate in the range of 50 to 53 per 1,000 population can be estimated. Similarly, a crude death rate in the range of 28 to 32 per 1,000 population can be estimated by applying the age-sex-specific death rates estimated by each of the two logit procedures for males with the single logit procedure for females to the adjusted age-sex distribution (see tables E and H).<sup>5</sup> However, because single estimates of the rates are needed to adjust the population and to determine growth rates for projecting and rejuvenating the population, single estimates which were considered the "most reasonable" estimates from the range were needed. Based on the comparison between the two patterns of fertility and the standard age pattern of marital fertility applied to Afghanistan (see table D), the age-specific fertility rates associated with the current fertility pattern adjusted to the level estimated by the curve-fitting technique resulted in a "most reasonable" point estimate for the crude birth rate of 50 per 1,000 population. Based on a graphical comparison between the age-sex-specific death rates from the various logit procedures (see figures 1 and 2), the second logit procedure for males and the single logit procedure for females resulted in a "most reasonable" point estimate for the crude death rate of 32 per 1,000 population. In the same manner, ranges of implied life expectancies at birth were preferred, but, as it was necessary to choose a single life table to adjust other data, "most reasonable" estimates of life expectancies at birth of 34 years for males and 36 years for females were accepted.

The total population figure for Afghanistan is also uncertain. The survey was conducted among the settled population, but there is a nomad population as well. An official estimate made by the Government of Afghanistan from fragmentary data sources puts the nomad population at about 2.4 million in 1975-76 (Hakimi, 1977, p. 3). The Afghan survey project preliminary estimate for nomads was about 1.2 million in 1974. Based on the survey results and official estimates, the total population can be variously estimated at between 14 and 17 million for 1975-76.

The socioeconomic and family planning data from the survey are limited. They do point out the lack of education in the general population, low literacy achievement, and the small participation of women in education and economic activity. The family planning data presented in the survey indicate that modern methods of family planning were unknown to the vast majority of Afghan women at the time of the survey.

This paper concentrated on data for the settled population at the national level. Much of the data, however, are presented in the survey report for the urban and rural populations. Analysis of the data by their urban and rural components should be of great interest and may lead to a more complete understanding of the dynamics of the Afghan population.

<sup>5</sup> The difference between the crude rates reported here and those reported on page 3, and in table F are the result of adjustments to the reported age-sex distribution.

## REFERENCES

### Survey Report

Chu, Solomon, Robert N. Hill, and Saxon Graham. 1975. *National Demographic and Family Guidance Survey of the Settled Population of Afghanistan. Volume 1: Demography*. Sponsored by the Government of Afghanistan and the Agency for International Development, Government of the United States.

Chu, Solomon, Robert N. Hill, and Paul A. Martino, editors. 1975. *National Demographic and Family Guidance Survey of the Settled Population of Afghanistan. Volume 2: Methodology*. Sponsored by the Government of Afghanistan and the Agency for International Development, Government of the United States.

Martino, Paul A. and Susan F. Schull, editors. 1975. *National Demographic and Family Guidance Survey of the Settled Population of Afghanistan. Volume 3: Tables*. Sponsored by the Government of Afghanistan and the Agency for International Development, Government of the United States.

### Other Sources

Arriaga, Eduardo E. 1968. *New Life Tables for Latin American Populations In the Nineteenth and Twentieth Centuries*. Population Monograph Series, No. 3. Berkeley: Institute of International Studies, University of California.

Brass, William, Ansley J. Coale, Paul Demeny, Don F. Heisel, Frank Lorimer, Anatole Romaniuk, and Etienne Van DeWalle. 1968. *The Demography of Tropical Africa*. Princeton: Princeton University Press.

Coale, Ansley J. and Paul Demeny. 1966. *Regional Model Life Tables and Stable Populations*. Princeton: Princeton University Press.

Hakimi, Abdul Karim. 1977. *Country Report (Afghanistan)*. Fifth Population Census Conference. Honolulu, Hawaii. (mimeographed).

Kalbfleisch, J. D. and D. A. Sprott. 1969. "Applications of Likelihood and Fiducial Probability to Sampling Finite Populations." In *New Developments in Survey Sampling*, edited by N. L. Johnson and H. Smith, Jr. New York: Wiley-Interscience.

Royall, Richard M. 1970. "On Finite Population Sampling Theory Under Certain Linear Regression Models." *Biometrika*, Volume 57, Number 2.

\_\_\_\_\_. 1971. "Linear Regression Models in Finite Population Sampling Theory." In *Foundations of Statistical Inference*, edited by V. P. Godambe and D. A. Sprott. Toronto: Holt, Rinehart and Winston.

\_\_\_\_\_. 1973. "The Prediction Approach to Finite Population Sampling Theory: Application to the Hospital Discharge Survey." In *Vital and Health Statistics, Series 2, No. 55*. Washington, D.C.: U.S. Government Printing Office.

Smith, Harvey H., Donald W. Bernier, Frederica W. Bunge, Francis Chadwick Rintz, Rinn-Sup Shinn, and Suzanne Teleki. 1973. *Area Handbook for Afghanistan*. Washington, D.C.: U.S. Government Printing Office.

United Nations. 1967. *Methods of Estimating Basic Demographic Measures from Incomplete Data*. Population Studies, No. 42, Manual IV. New York.

\_\_\_\_\_. 1975. *Single-Year Population Estimates and Projections for Major Areas, Regions, and Countries of the World, 1950-2000*. Working Paper No. 56. New York.

U.S. Agency for International Development, Family Planning Services Division. [1976]. *Family Planning Service Statistics. Annual Report 1975*.

U.S. Bureau of the Census, International Statistical Programs Center. 1975. *Family Planning Statistics: 1965 to 1973, Africa, Asia, and Latin America*. Washington, D.C.: U.S. Government Printing Office.



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